



**Massachusetts Bay
Transportation Authority**

Arborway and Quincy Garages

Bus Operations Overview

January 2017



Agenda

Service Information

Fleet Overview

Facilities Overview

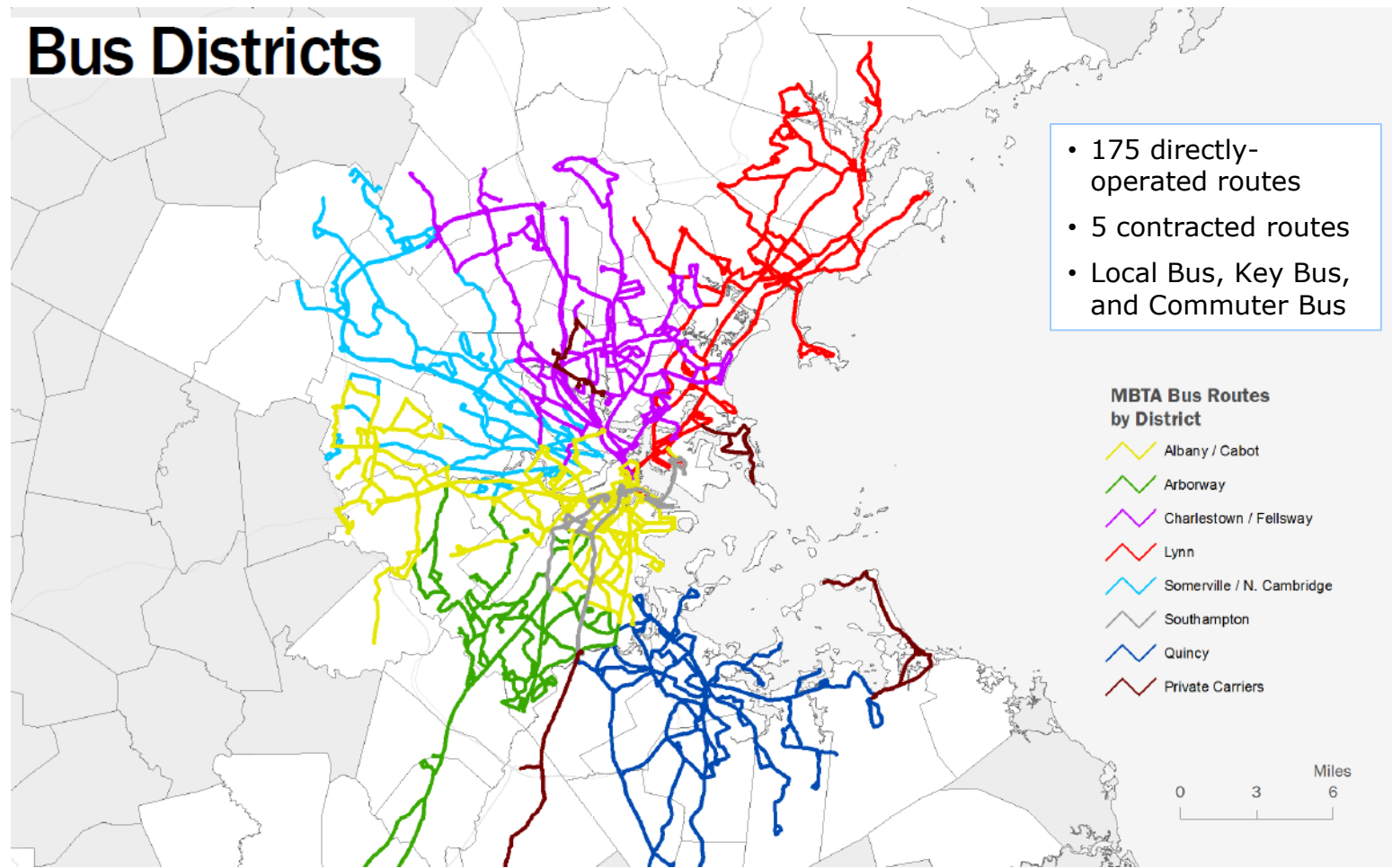
Staff Overview

Financials

Key Operational and Cost Performance Metrics



The MBTA currently provides 175 directly-operated and 5 contracted routes

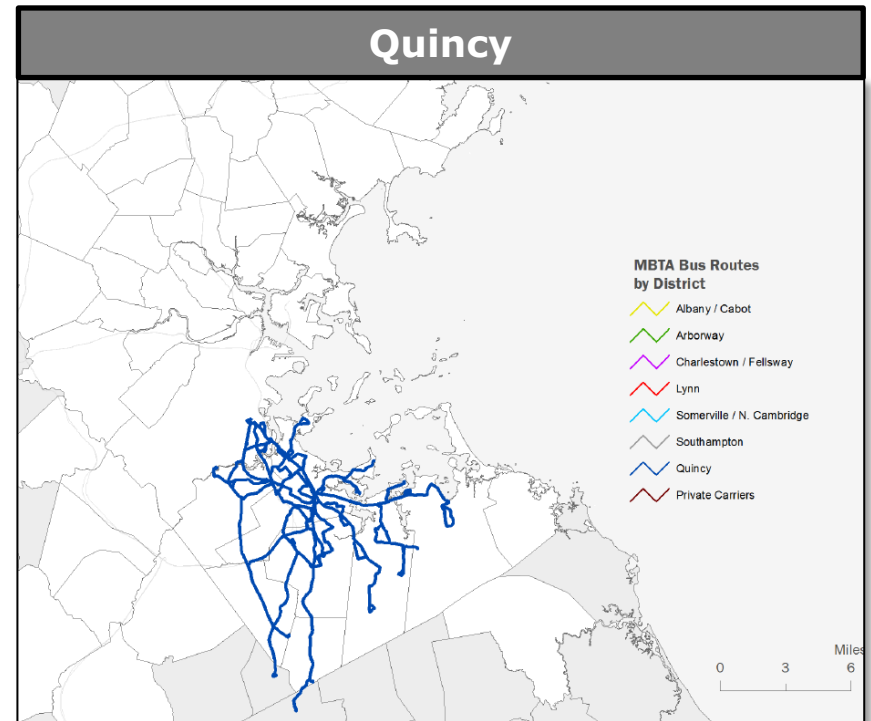
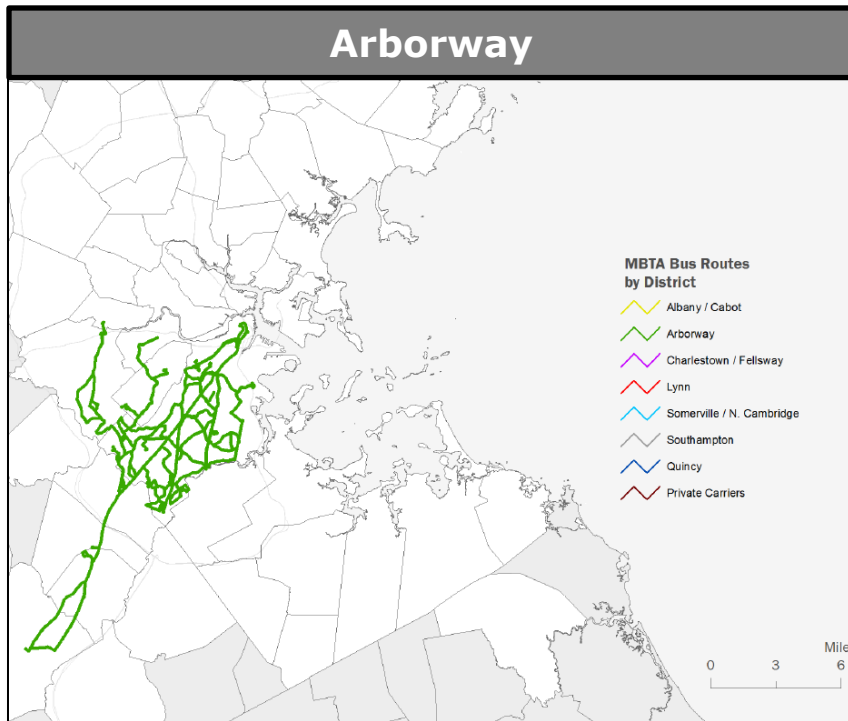


Source: MBTA Office of Performance Management and Innovation

Draft for Discussion & Policy Purposes Only



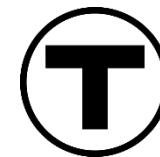
Arborway and Quincy Districts



Arborway and Quincy primarily serve southern and western portions of the metro Boston area

Source: MBTA Office of Performance Management and Innovation

Draft for Discussion & Policy Purposes Only



Arborway: FY16 Revenue Hours, Ridership, and Fare Revenue by Route

FY16 Arborway Route-Level Statistics:

Route	Scheduled Revenue Hrs.	Est. Annual Ridership	Allocated Fare Revenue
14	10,795	422,401	\$321,911
21	14,134	1,375,457	\$926,334
24	9,758	556,769	\$480,692
26	7,796	485,475	\$356,875
27	3,712	225,186	\$111,154
29	12,420	640,583	\$370,090
30	10,884	726,388	\$524,673
31	29,900	2,013,118	\$1,652,769
32	44,551	3,358,038	\$2,601,172
33	6,501	363,194	\$222,603
34	18,522	1,194,211	\$899,447
35	14,549	668,330	\$495,605
36	18,044	975,265	\$797,329
37	10,008	467,600	\$320,577
38	7,256	250,853	\$155,148

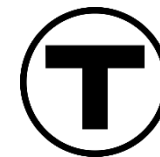
(cont.)

Route	Scheduled Revenue Hrs.	Est. Annual Ridership	Allocated Fare Revenue
40	7,399	439,842	\$334,155
41	16,389	722,826	\$509,055
42	12,606	853,133	\$635,070
50	6,417	353,626	\$214,851
51	10,743	520,806	\$318,010
52	6,872	150,514	\$74,295
191	510	27,820	\$6,160
192	334	18,512	\$8,368
195	172	4,560	\$4,582
34E	26,915	1,101,251	\$989,682
TOTAL	307,186	17,915,759	\$13,330,608

FY16 Actual Revenue
Hrs. = **301K**

Note: does not include Route 28 (utilizes both Arborway and Southampton facilities); fare revenues allocated to individual routes based on average fares and ridership (typical weekday, Saturday and Sunday boardings)

Source: MBTA Internal Data



Quincy: FY16 Revenue Hours, Ridership, and Fare Revenue by Route

FY16 Quincy Route-Level Statistics:

Route	Scheduled Revenue Hrs.	Est. Annual Ridership	Allocated Fare Revenue
201	6,801	213,548	\$158,768
202	5,431	170,498	\$107,958
210	6,561	216,830	\$145,818
211	6,686	227,245	\$143,290
212	1,905	80,688	\$67,519
214	5,604	325,156	\$160,500
215	11,846	568,422	\$450,930
216	10,465	446,805	\$445,540
217	1,203	56,706	\$27,991
220	15,085	543,712	\$432,963
221	730	20,644	\$10,190
222	12,634	476,648	\$341,573
225	18,639	939,770	\$659,313
230	13,829	513,443	\$372,682
236	6,163	217,469	\$203,506

(cont.)

Route	Scheduled Revenue Hrs.	Est. Annual Ridership	Allocated Fare Revenue
238	12,548	575,094	\$464,521
240	20,968	884,603	\$672,083
245	4,748	144,924	\$71,536
TOTAL	161,847	6,622,205	\$4,936,681

FY16 Actual Revenue
Hrs. = **155K**

Note: Fare revenues allocated to individual routes based on average fares and ridership (typical weekday, Saturday and Sunday boardings)
Source: MBTA Internal Data



Agenda

Service Information

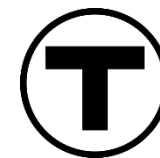
Fleet Overview

Facilities Overview

Staff Overview

Financials

Key Operational and Cost Performance Metrics

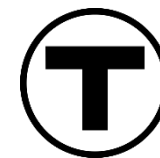


Bus Fleet Allocation by Garage (before arrival of incoming New Flyer fleet)

MBTA Bus Fleet Allocation by Garage (as of 07/01/2016)

Facility	Number of Buses	Fleet Avg. Age (years)	Spare Buses (Garage Total – AM Peak)	Spare Ratio
Albany	116	12	24	21%
Arborway	120	12	21	18%
Cabot	178	12	27	15%
Charlestown	248	11	60	24%
Fellsway	76	12	21	28%
Lynn	89	8	14	16%
North Cambridge	28	12	18	64%
Quincy	86	8	27	31%
Southampton	99	11	39	39%
TOTAL	1,040	11	251	24%

Note: An additional 4 buses are assigned to Everett Bus Shop; does not include 123 buses that will have arrived by end of calendar year 2016 at Arborway, Cabot, and Southampton as part of New Flyer Procurement; does not include Cabot Tire Shop
Source: MBTA Internal Data; National Transit Database (NTD)



Bus Fleet Detailed Specifications (before arrival of incoming New Flyer fleet)

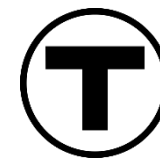
Bus Fleet Detailed Specifications – NTD Reporting* (Calendar Year 2015)

OEM	Total Vehicles	Active Vehicles	Model	Year Manufactured	Year Rebuilt	Fuel Type	Vehicle Length (FT)	Seating Capacity	Standing Capacity	Miles This Year
New Flyer	15	12	600116	2001		CNG	40	39	56	130,135
NABI	299	299	2001-2299	2004	2010	CNG	40	39	55	7,471,234
Neoplan	18	18	10011044	2003		CNG	60	57	81	309,853
Neoplan	193	193	04010593	2004		Diesel	40	38	58	3,806,322
Neoplan	32	0	11011132	2004		CNG	60	47	71	(Retired)
NOVA	110	100	0010400	1994	2003	Diesel	40	40	60	1,012,886
New Flyer	310	308	600909	2006		Diesel	40	39	50	10,836,875
New Flyer	60	60	1400-1459	2014		Diesel	40	37	50	878,319
New Flyer	22	22	1200-1224	2010		Diesel	60	57	81	527,501
Neoplan	22	22	1001-1020,1030	2004		Dual	60	57	81	302,280

Arborway has 120 of the NABI CNG fleet (replaced by August 2017); **Quincy** has 86 of the New Flyer diesel fleet

Source: MBTA Internal Data; National Transit Database (NTD)

Draft for Discussion & Policy Purposes Only



Ongoing and Future Procurements

Ongoing and Future Procurements:

Vehicle Type	Model	# of Vehicles	Scheduled Arrival	Manufacturer	Propulsion
Bus (BU)	New Flyer XN 40FT	175	Oct 2016 - Aug 2017	New Flyer of America	CNG
Bus (BU)	New Flyer XDE 40FT	150	Oct 2016 - Aug 2017	New Flyer of America	Diesel Hybrid
Articulated Bus (AB)	New Flyer XDE 60FT	44	Oct 2016 - Aug 2017	New Flyer of America	Diesel Hybrid
Bus (BU)	New Flyer XDE 40FT	60	TBD	New Flyer of America	Diesel Hybrid

Arborway receiving 120 of the 175 incoming New Flyer CNG 40FT buses (will replace Arborway's fleet entirely)

Note: An additional 4 buses are assigned to Everett Bus Shop; does not include 123 buses that will have arrived by end of calendar year 2016 at Arborway, Cabot, and Southampton as part of New Flyer Procurement
Source: MBTA Internal Data



Agenda

Service Information

Fleet Overview

Facilities Overview

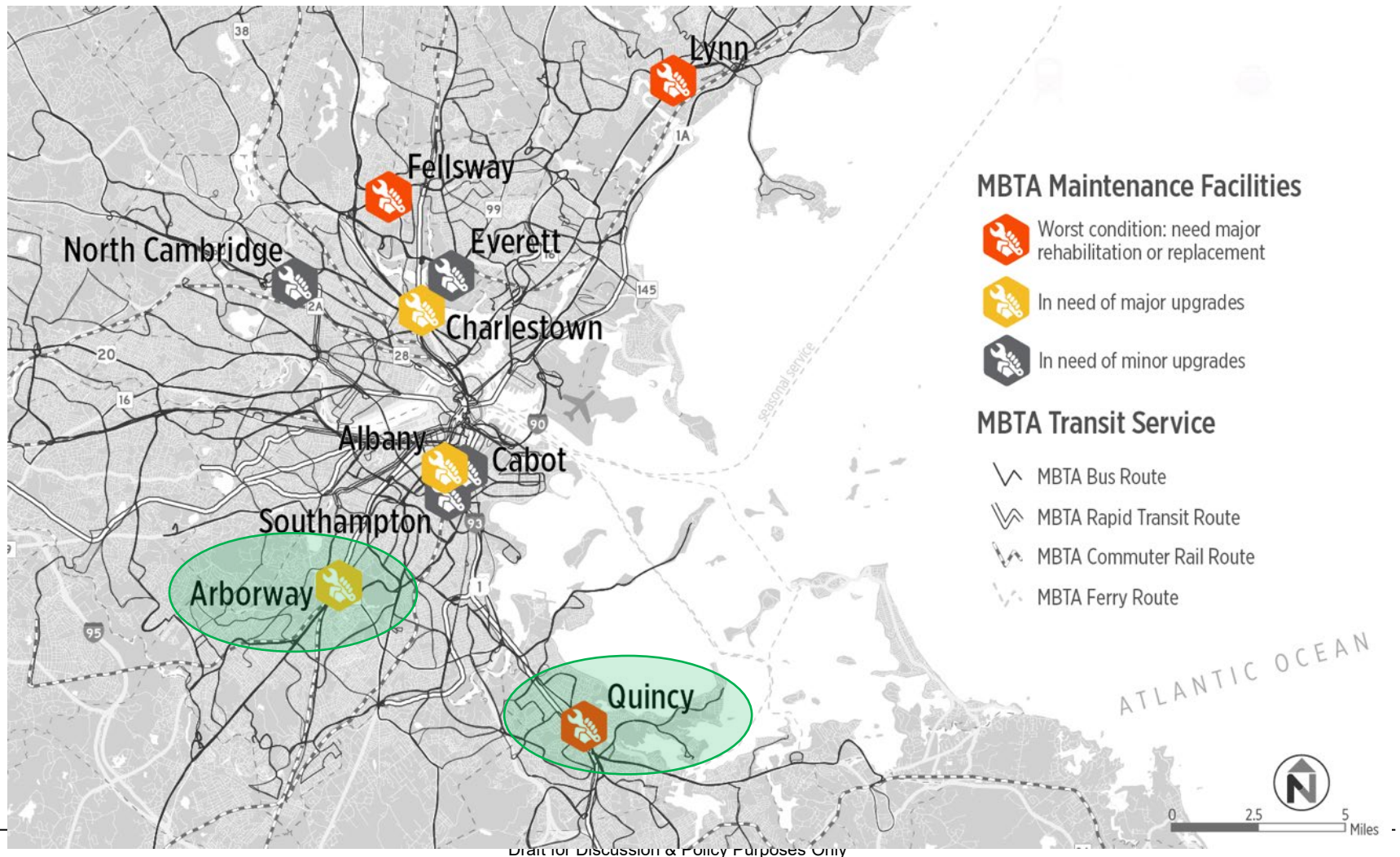
Staff Overview

Financials

Key Operational and Cost Performance Metrics



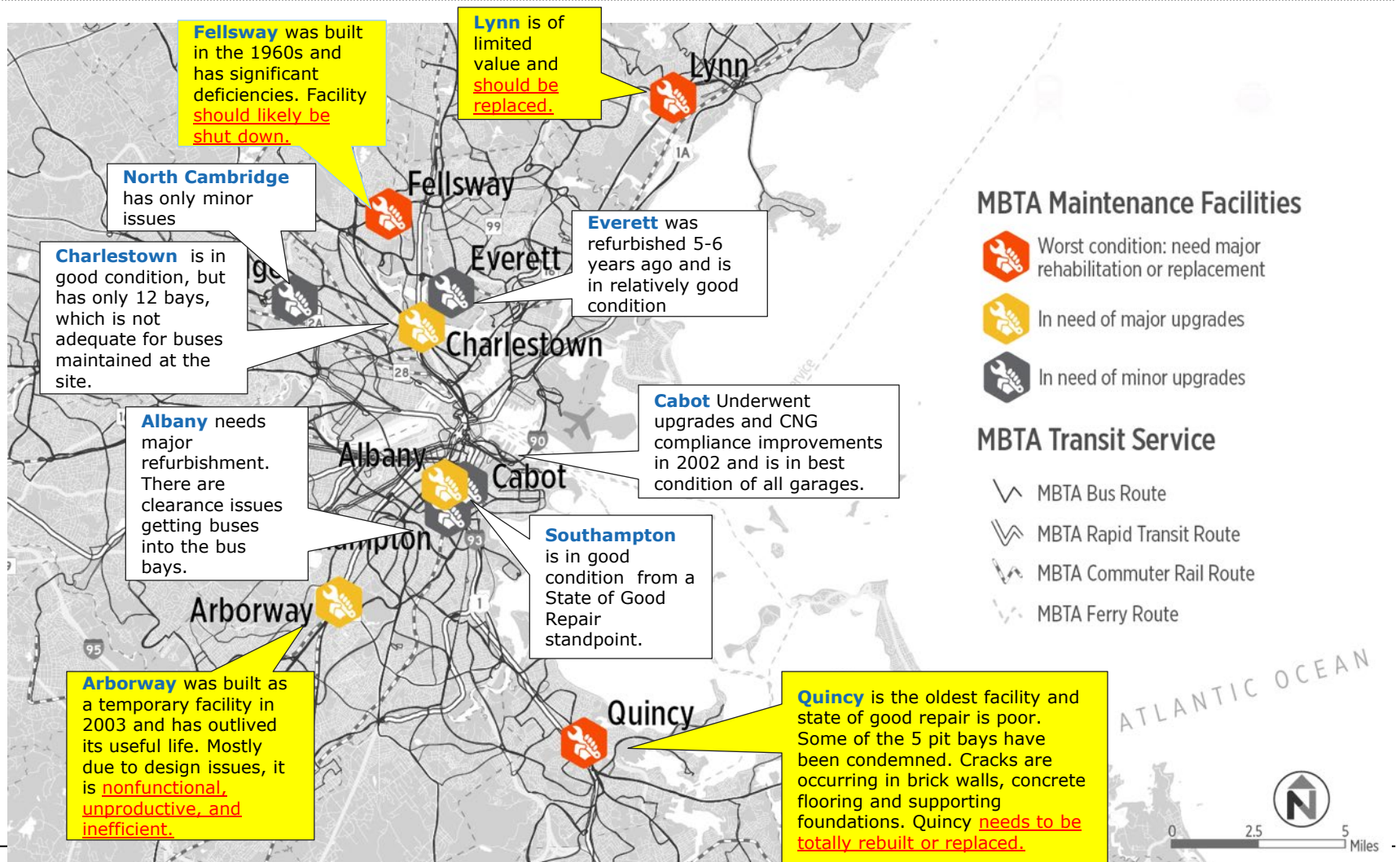
MBTA operates 9 bus garages and 1 heavy repair facility



Draft for Discussion & Policy Purposes Only




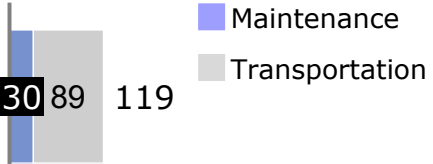
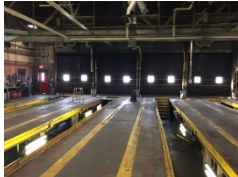
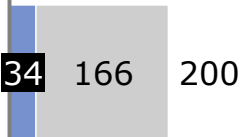

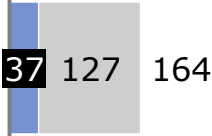

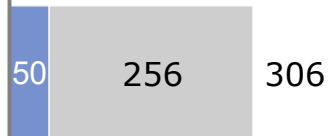
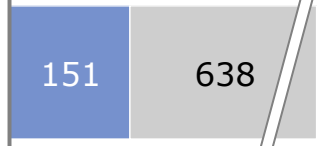
Findings from MassDOT “FOCUS 40” Report



Source: MBTA 2014 Blue Book and “MBTA Maintenance Facility Analysis: Walk Around Document,” December 2014, and MBTA document “Evaluation/Condition Assessment of MBTA Bus Maintenance Facilities,” recent but undated.



Arborway and Quincy are 2 of 4 garages identified as needing to be rebuilt or replaced

Facility	Assessment per MassDOT Focus40	FY16 cost ²	FY16 avg. headcount	# of buses
Fellsway (Built 1925) 	"Very poor condition."	\$13M		76
Lynn (Built 1936) 	"Not suitable for maintenance of modern vehicles. Prior assessment recommended converting to storage and operations only and relocating maintenance"	\$24M		89
Quincy (Built 1930) 	"Built in 1930. In poor condition and not suitable for modern maintenance needs and practices. Needs to be rebuilt or replaced"	\$20M		86
Arborway (Built 2000 ¹) 	"Temporary facility built in 2003. Some facilities in trailers, and only six repair bays for 119 buses."	\$35M		120
Total		\$111M ³		371

1 Built in 2000 as a temporary facility

2 Total transportation and maintenance cost of facility, not including any allocation of Everett heavy repair facility

3 Includes ~\$19M of Everett and Admin allocation

Source: MBTA Internal Data



Arborway Garage

Garage Overview	
Year Built	2000
# of Maintenance Personnel*	42
# of Buses^	120
Bus Fleet Types	40FT CNG
Facility Space	
Total Square Ft.	15,900
# of Maintenance Bays	6
Overnight Bus Storage Capacity (Indoor / Outdoor)	0 / 124
# of Service Lanes	2
# of Shifts (Weekday / Weekend)	3 / 3

*Includes machinists, fuelers, car cleaners, forepersons, and supervisors

^Reflects number of buses as of 7/1/2016

Source: MBTA Internal Data (compiled on behalf of MBTA by CH2M Hill)



Aerial View – 3600 Washington St. (Jamaica Plain)



Outside View (temporary facility made of trailers)



Quincy Garage

Garage Overview	
Year Built	1930
# of Maintenance Personnel*	34
# of Buses^	86
Bus Fleet Types	40FT ECD
Facility Space	
Total Square Ft.	34,600
# of Maintenance Bays	8
Overnight Bus Storage Capacity (Indoor / Outdoor)	34 / 56
# of Service Lanes	1
# of Shifts (Weekday / Weekend)	3 / 5

*Includes machinists, fuelers, car cleaners, forepersons, and supervisors

^Reflects number of buses as of 7/1/2016

Source: MBTA Internal Data (compiled on behalf of MBTA by CH2M Hill)



Aerial View – 954 Hancock St., Quincy, MA



Entrance (low clearance)



Agenda

Service Information

Fleet Overview

Facilities Overview

Staff Overview

Financials

Key Operational and Cost Performance Metrics



There are 363 transportation and 74 maintenance employees in Arborway and Quincy

	JOB DESCRIPTION	UNION	ARBORWAY	QUINCY	GRAND TOTAL
BUS MAINTENANCE	Fueler	L264	9	5	14
	Cleaner, Car	L589	1	2	3
	Machinist	L264	21	20	41
	Machinist (Grandfathered 11/08)	L264	1	1	2
	Foreperson, Automotive	ALL	5	4	9
	Foreperson, Auto Maintenance	ALL	1	1	2
	Supervisor, Bus Maintenance	L453	1	1	2
	Superintendent, Bus Maintenance	TEA	1	-	1
SUBTOTAL - MAINTENANCE			40	34	74
BUS TRANSPORTATION	Operator, Part-Time Surface	L589	44	32	76
	Operator, Surface	L589	170	79	249
	Inspector, Spare Bus	L589	1	1	2
	Inspector, Bus	L600	23	8	31
	Supervisor, Bus Transportation	L453	3		3
	Superintendent, Bus Transportation	TEA	1	1	2
SUBTOTAL - TRANSPORTATION			242	121	363
GRAND TOTAL			282	155	437

Note: Reflects active and paid headcount as of 12/9/2016 (i.e., does not include union officials and other employees on unpaid leave – 20 total)
Source: MBTA Internal Data

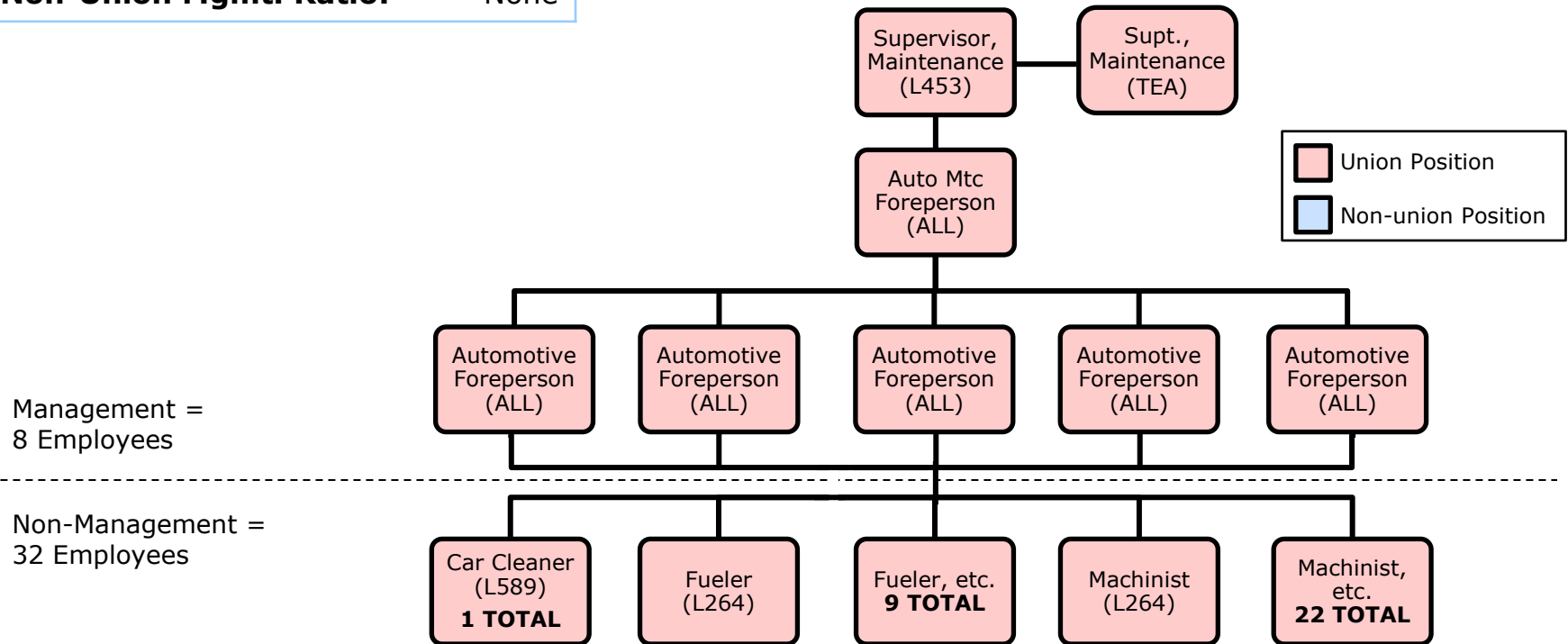


Example Org. Chart - Arborway

Management Ratio: 1 : 4

Non-Union Mgmt. Ratio: None

ARBORWAY GARAGE



Note: Reflects count of active and paid employees as of 12/09/2016 (i.e., does not include union officials and other employees on unpaid leave)
Source: MBTA Internal Data



Agenda

Service Information

Fleet Overview

Facilities Overview

Staff Overview

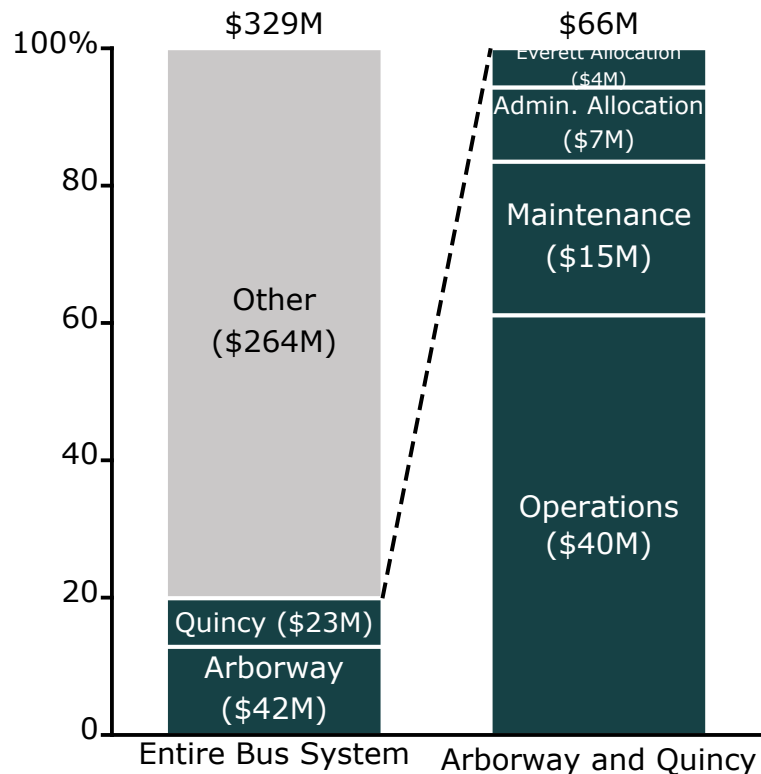
Financials

Key Operational and Cost Performance Metrics



Arborway and Quincy accounted for \$66M in costs in FY16

FY16 MBTA Bus Operations
and Maintenance Costs



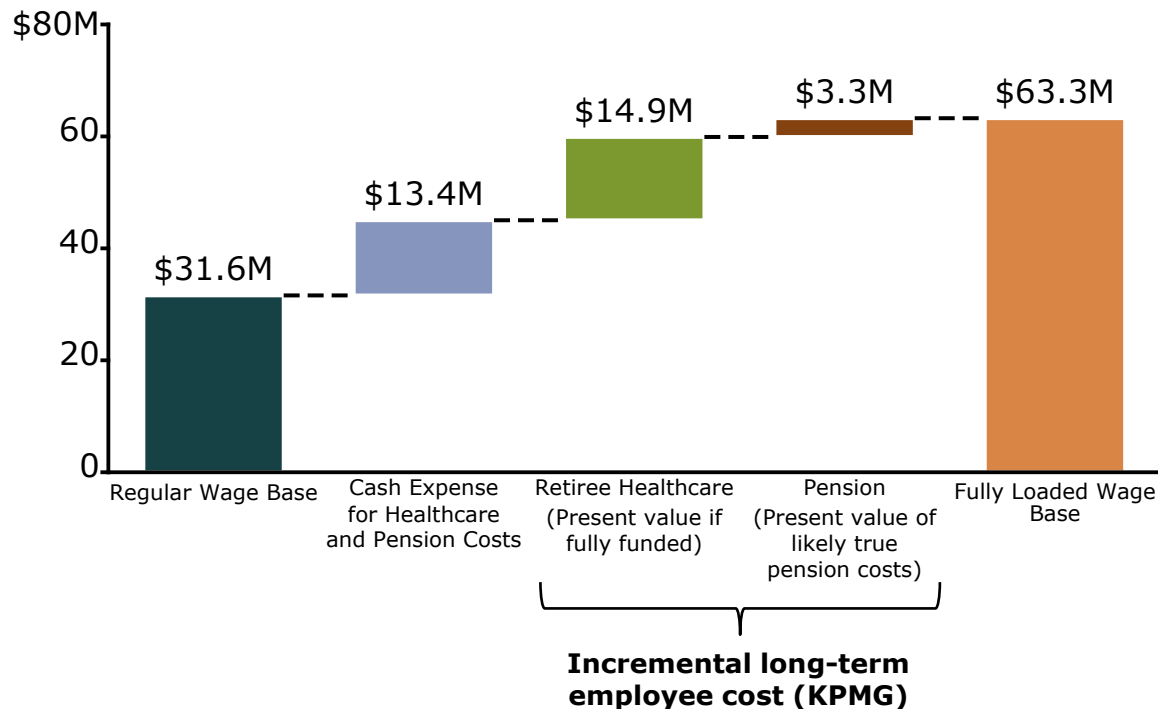
(\$M)	Arborway	Quincy	TOTAL
Operations	\$26.8	\$13.2	\$40.0
Regular Wages	\$16.9	\$8.2	\$25.1
Overtime	\$1.1	\$0.7	\$1.8
Cash Fringe	\$8.8	\$4.3	\$13.1
Maintenance	\$8.3	\$6.3	\$14.7
Regular Wages	\$3.7	\$2.8	\$6.5
Overtime	\$0.7	\$0.5	\$1.2
Cash Fringe	\$2.1	\$1.6	\$3.7
Materials and Services	\$1.8	\$1.5	\$3.3
Admin. Alloc.	\$4.66	\$2.41	\$7.08
Everett Alloc.	\$2.47	\$1.28	\$3.74

Note: portion of Everett heavy repair facility and G&A (admin.) costs allocated to garages based on their proportion of annual vehicle hours
Source: MBTA Internal Data



Accounting for fully loaded wages of MBTA employees increases FY16 costs at these garages to \$81M

FY16 Bus System Wages - Arborway and Quincy



Arborway and Quincy (\$M)	
Regular Wages	\$31.6
Cash Expense for Healthcare and Pension	\$13.4
Retiree Healthcare	\$14.9
Pension (5% discount)	\$3.3
Overtime, incl. FICA	\$3.2
Materials & Services	\$3.3
Admin. Allocation	\$7.1
Everett Allocation	\$3.7
TOTAL	\$80.6

Note: Actuarially derived pension fund liability calculations use a 7.75% discount rate. However, average historical pension fund returns have underachieved, increasing MBTA's pension contribution and unfunded liability over time. Given current low return environment and pension profile, a 5.0% discount rate more fully reflects MBTA's expected costs. \$3.3M represents incremental funds required to fund a 5.00% discount rate environment.

Source: MBTA Internal Data



Agenda

Service Information

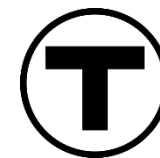
Fleet Overview

Facilities Overview

Staff Overview

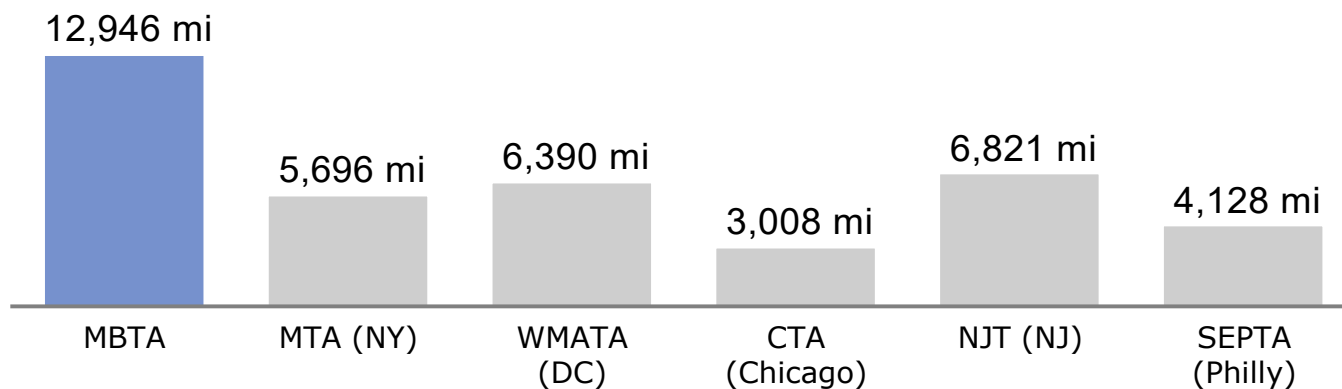
Financials

Key Operational and Cost Performance Metrics

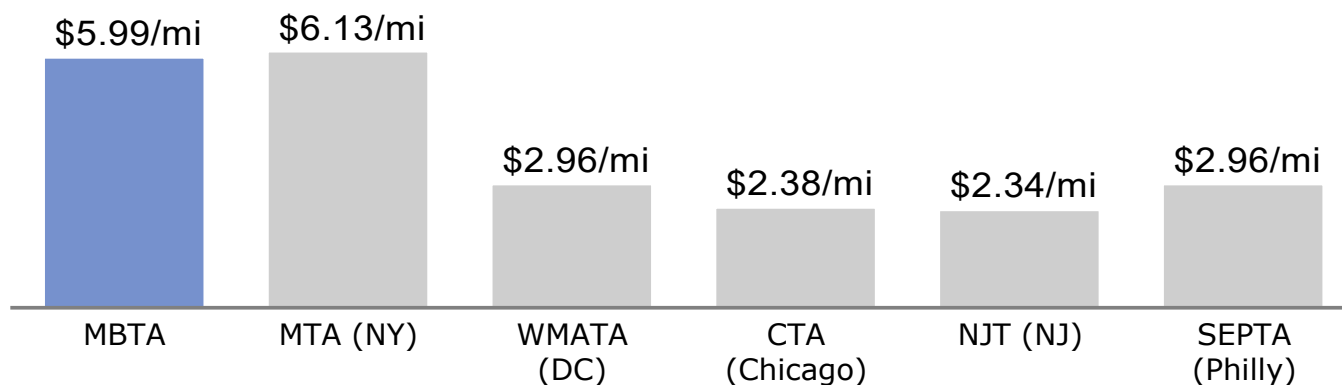


MMBF and Cost per Mile

Mean miles between failures (MMBF)



Maintenance cost per mile (fully loaded, incl. fuel)*





*Reflects cost per mile figures as calculated for and reported to National Transit Database (NTD)
Source: MBTA bus maintenance audit (CH2M Hill, conducted Spring 2016); National Transit Database



Standard Repair Times

- Bus Maintenance management has implemented SRTs for 116 out of 840 total tasks
 - Initial focus on high-frequency, high-volume tasks
- All future fleets will come with suggested SRTs from the OEM (verified by training staff)
- Work Orders now printed with a bulleted list of tasks currently covered by SRTs
- Progress still to be made: analysis for month of October across sample of 6 garages showed that 12% of total MCRS2 hours were covered by SRTs*

<div>  <div> Labor Standards Coverage From 10/01/2016 Through 10/31/2016 SUMMARY </div> <div>  </div> </div>				
This report omits NOVA, NABI, CNG 60 FT, DIESEL CONT B, 09-NF-DLF-60-HYBRID, CNG NEW FLYER, NEW FLYER HYBRID, and 15-ELDORADO-H-40 standards classes and Everett locations (413 and 414).				
	TOTAL TASKS	TASKS WITH STANDARDS	TOTAL HOURS	% HOURS WITH STANDARDS
442 - ALBANY GARAGE				
ECD NEOPLAN 40FT-2ND LIFE - REBUILT NEOPLAN 40FT ECD				
ECD NEOPLAN 40FT-2ND LIFE - REBUILT NEOPLAN 40FT ECD	220	28	3,699.22	9.89%
442 - ALBANY GARAGE	220	28	3,699.22	9.89%
REPORT LABOR TOTALS:			20,391.38	12.49%

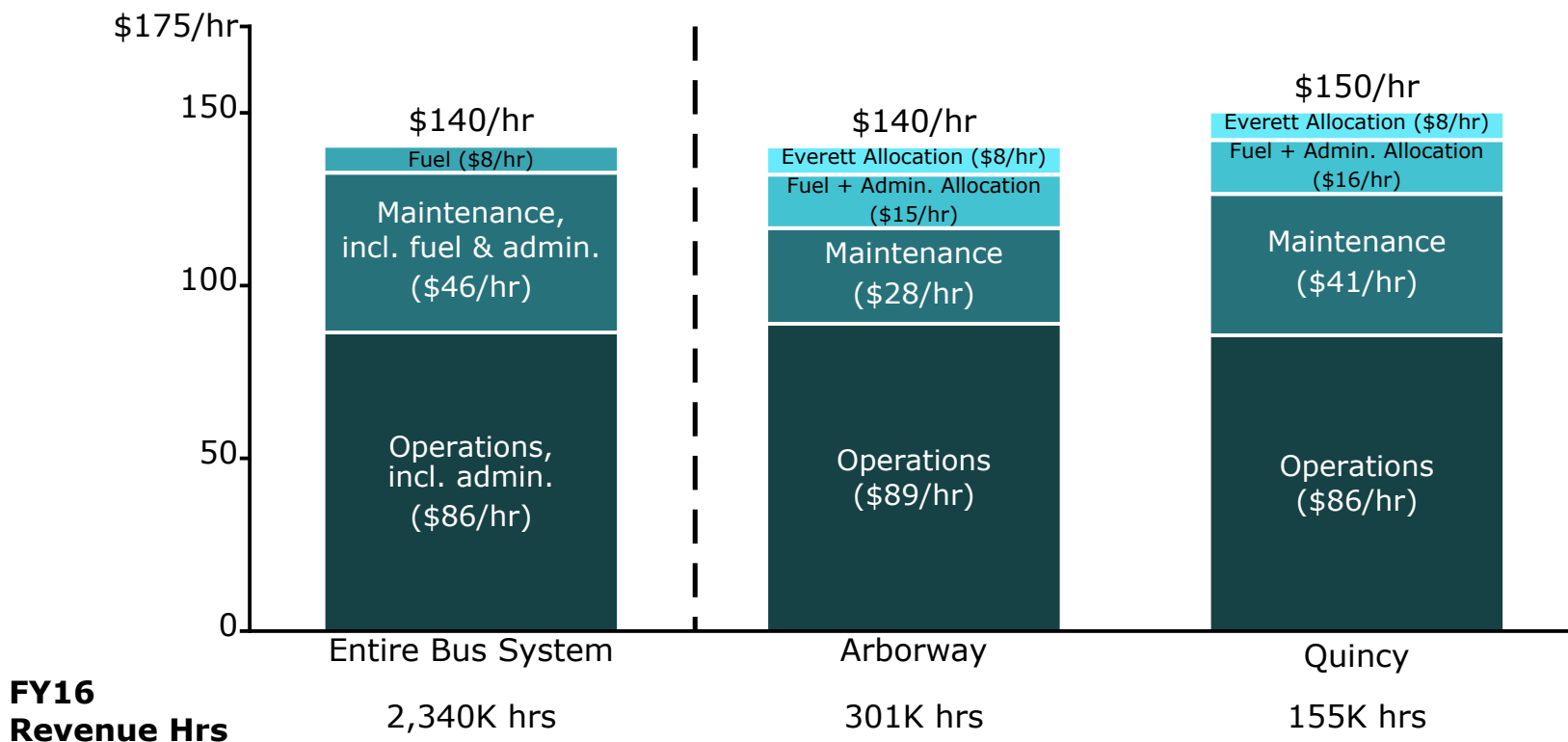
More SRTs currently being developed

*Analysis covered total MCRS2 hours in Oct 2016 for all job classifications at Albany, Fellsway, Charlestown, Quincy, Lynn, and Southampton
 Source: MBTA Bus Maintenance Progress Report; MBTA Internal Data



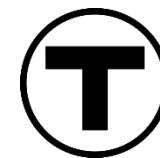
Cost per revenue hour

FY16 Cost per Revenue Hour

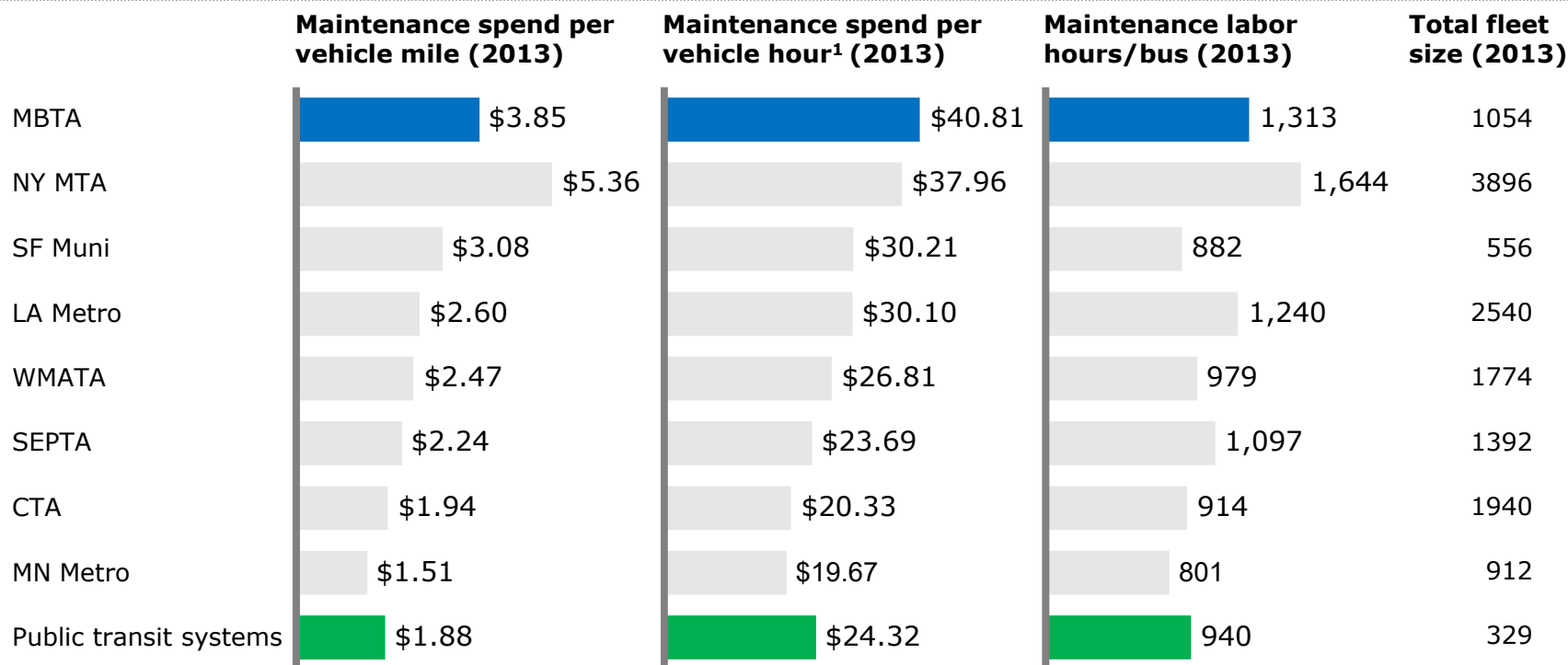


Note: Revenue hours reflect actual hours run, not scheduled hours; allocation for Everett heavy repair facility and G&A (admin.) added to Arborway and Quincy based on their proportion of total annual vehicle hours

Source: MBTA Internal Data



Cost per total hours vs. peer agencies



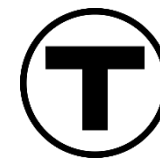
For the 7 large, urban transit peer comparisons above, the average fleet age was 10 years

“Public transit systems” average includes 71 public transit systems with

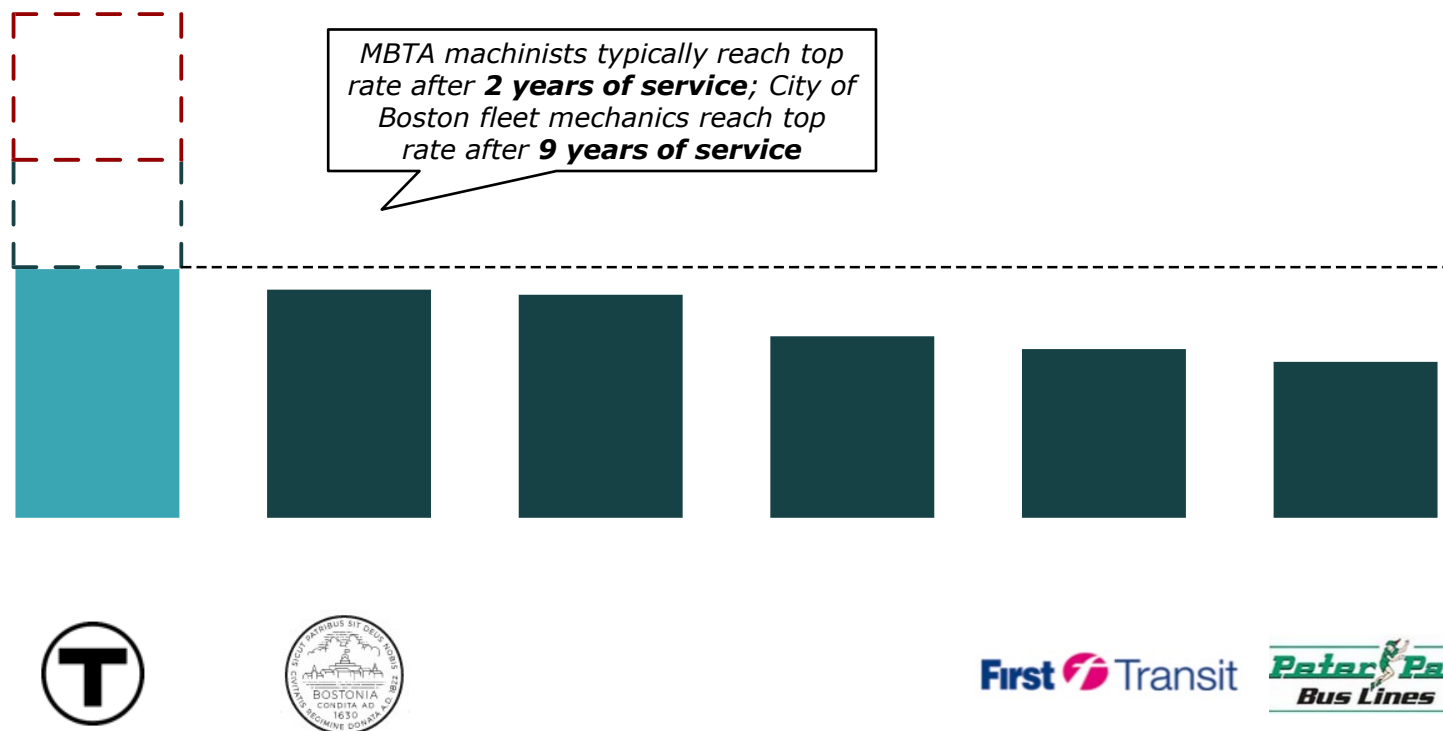
- Average fleet age older than 10 years
- Total fleet size over 100 buses
- Largely public, but some private operators

¹ Includes both revenue and deadhead hours

Source: National Transit Database. All numbers are for 2013 and include maintenance fuel expenditures, but not operating fuel expenditures



MBTA bus machinist wage rates



*Hourly mean wage of bus and truck mechanics and diesel engine specialists in Boston-Cambridge-Newton region in May 2015
Note: Peer systems (Chicago, NYC, and Washington D.C.) top wage rates are ~10% lower on average than the MBTA top rates
Source: MBTA Internal Data; Bureau of Labor Statistics; Interview with Peter Pan; CT Transit Salaries in CT from Indeed.com; Boston.gov